SEPTEMBER
1941

Radio

SERVICE DEALER

This Month

RIDER ON GAIN DATA

STORM WARNINGS UP

RSD WINDOW PLACARD

ON THE RADIOFRONT

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Radio
SERVICE-DEALER
SOUNDMAN AND JOBBER
Reg. U. S. Pat. Off.

Ad Index

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Cover Photo

★ What of tomorrow? Events move swiftly, conditions change, and no one can foretell the future. Hence, we must prepare for all eventualities. See page 3.

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VOL. 2 NO. 9 ★ SEPTEMBER, 1941

8 INSURANCE POLICIES every Soundman must have . . . and gets *only from RACON*

1. ***ADVANCED ENGINEERING DESIGN*** —RACON engineers, constantly engaged in research, have developed reproducers that are accepted as the Standard By Which Others Are Judged.

2. ***EXCLUSIVE PATENTED FEATURES*** — Only RACON offers Storm-proof, Break-proof, Acoustic Material . . . which many have tried to imitate unsuccessfully.

3. ***COMPLETE LINE*** —*Only* RACON makes a *complete* line of sound reproducers and driving units. There is a RACON for every conceivable purpose.

4. ***COMPETITIVE PRICES*** —"Priced right," RACONs actually cost you less than other makes as they are absolutely dependable, afford longest trouble-free service under the most severe operating conditions . . . and they are preferred by the men who know the sound business.

5. ***QUALITY MATERIALS*** —RACON never compromised. Quality materials and workmanship are paramount.

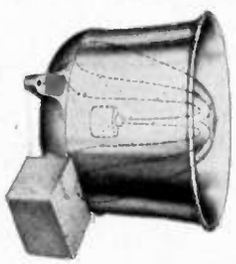
6. ***DEPENDABLE, PEAK EFFICIENCY PERFORMANCE*** —*Only* RACON speakers deliver maximum output and response for the size of driving unit used.

7. ***PATENT PROTECTION*** — RACON's comprehensive patents on *all types* of sound distribution devices are your insurance against infringement and damage suits.

8. ***DEPENDABLE SOURCE OF SUPPLY*** — RACON, the industry's oldest and largest manufacturer of air-column horns, speakers and driving units is still 'on top' . . . producing and delivering more horns and units than ever before.

Ask your Jobber for a new catalog or write us direct

MARINE HORN SPEAKERS



Re-entrant type speakers using horn type units for marine and general P-A applications — may be used as loudspeaker or as a microphone. Miniature and regular sizes approved by the Bureau of Marine Inspection and Navigation, Department of Commerce, for marine work. In all sizes, miniature, midget, regular and bull, handling from 5 to 50 watts.

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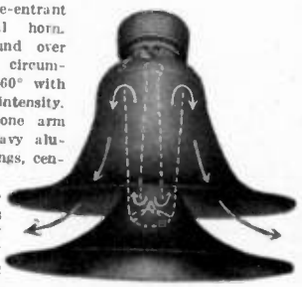
A 3½ foot re-entrant type Radial horn. Projects sound over a complete circumference of 360° with an even intensity. Base and tone arm made of heavy aluminum castings, centre deflector, and deflecting bells made of RACON ACOUSTIC material to prevent all resonant effects. Storm-proofed and guaranteed against all weather conditions. Uses Standard RACON Units.



Re-Entrant Trumpets

A compact trumpet of the double re-entrant type. Occupies but a small space, nevertheless has a long air column enabling it to deliver highly concentrated sound of the greatest efficiency over long distances. Base and inside cone arm made of aluminum castings, outside bell of heavy gauge aluminum spinning, centre section of RACON ACOUSTIC material to prevent resonant effects. Available in 6', 4½', 3½', and 3' air column units.

RACON ELECTRIC CO. 52 EAST 19th ST. NEW YORK, N. Y.

TRANSIENTS

STORM WARNING

A REVOLUTION is brewing in the radio servicing field. Radical changes are about to take place that may seriously hamper or completely destroy your business. The party is over, and hereafter independent servicemen and service organizations must face the rapidly-changing aspects of our national economy and defense efforts with some degree of realism. Failure to do this will mark the end of the independent in the radio repair business.

To begin with, radio dealers *and public utility companies* are set to lose a large part, if not all, of their retail business in radios and electrical appliances. To offset this loss, they are going to jump into the repair business with both feet. The public utilities, in particular, intend to set up units for the purpose of servicing *all appliances* run off their lines. Radio dealers will naturally bend every effort to hook the servicing business of their customers, to say nothing of the business of the other fellow's customers.

Second: Irrespective of what others may say, there is no indication at the present time that repair parts will be easy to obtain. There is a strong possibility that new parts may be available only on some form of trade-in basis, with the old parts going back to the factory for reproduction. In any event, your stock problems will multiply, and so will your repair problems.

Third: The interest of the Government in maintaining the broadcast system of public communication does not go beyond more than one properly operating receiver in each home. It is of no special concern to the Government whether that one receiver is the console in the living room or the midget in the bedroom brought down to the living room as a replacement. With higher taxes and living costs, it may take considerable effort to persuade people to keep all their receivers in good working order for the duration.

Fourth: We are again faced with the probability of wide-scale unemployment due to the retrenchment or stoppage of industries wholly occupied with civilian production. Many of those thrown out of work may drift into radio servicing, as many did in the past.

And above all, there is no telling what tomorrow will bring. But everything points to the necessity for the radio serviceman to give serious consideration to the spot he may soon be in, and what he should do to protect himself.

STORM SHELTER

IT IS INCREDIBLE that so many servicemen are so short-sighted as not to recognize the benefits of organization, with examples of its benefits on every side. National and local associations offer protection against unfair practices, outside competition and unjust accusations. Local associations serve to solidify the member's position in his own community; a national association gives a voice to the trade which, in itself, is a power with which to get things done. The independent is without such defenses.

One thing is certain—radio servicing is going to be "big business," but whether it is your big business or big business for the dealers and/or the public utilities depends upon what you intend doing about it. You can hold it if you get down to business for once. You can develop it if you'll organize now, before it is too late . . . and time is already short.

Busy days are here...

FOR

SERVICEMEN

Keep them profitable with dependable test equipment!

Today, as never before, the American public *wants radio* and can afford to pay for radio. Proof is that the demand for new sets has virtually doubled. But with long deliveries prevalent in so many fields, more old sets probably will be retubed and repaired than ever before. » » » A period like this is *made to order* for the servicemen with WESTON Test Equipment. For WESTONS help produce greater profit on every job. Measurements are simpler, surer . . . trouble can be spotted quicker . . . when these basic, direct-reading instruments are used.

But the *big* profit from WESTONS is shortly to come; for FM and television are rapidly getting into stride. *These same* WESTON *Test Instruments fully meet the new servicing problems involved. No new and expensive equipment will be needed for the job.* Thus it *pays* . . . and *continues to pay* . . . to use dependable WESTONS for all servicing needs. Weston Electrical Instrument Corporation, 605 Frelinghuysen Avenue, Newark, N. J.

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UHF Oscillator

Fundamental frequency coverage from 22 to 150 megacycles. No harmonics . . . no band switching. Used with portable antenna or standard output leads. Reads 40 kc per division at 40 mc. Self contained battery operation; compact and extremely portable.

WESTON

Test Instruments

Performance Ratings—Part II

John F. Rider

TO appreciate gain information properly it is necessary to understand the conditions under which various devices operate that are capable of amplification. Speaking in generalities, three conditions of amplification or gain in radio systems are to be found: 1, the presence of amplification; 2, the absence of amplification, but no loss, which, when described differently, is the same as unity transfer of voltage between two points; and 3, loss during the transfer of voltage between two points.

Which of these conditions prevails depends entirely upon the nature of the system. Whether or not the existing condition is the correct one depends entirely upon what is supposed to exist. In this connection, it is virtually impossible to present a list of all of the different conditions which may be found in receiving and transmitting systems, but it is possible to describe in brief, in order to create a general understanding of the subject, the nature of the devices associated with amplification.

TRANSFORMERS

As you probably appreciate, there are numerous types of transformers. Within the general category are those employed in r-f systems and those utilized in a-f systems. Power transformers of various kinds, filament transformers, and the like are not included in this discussion for they are not associated with the subject of gain. As to the r-f kind of transformer, we can consider it from the broadest viewpoint and assume that it embraces the i-f unit as well.

As a general rule, when one speaks about transformers associated with amplifying systems, it is the general thing to think about amplification available within the transformer. In other words, we just naturally take for granted that such gain is available, although in reality such is not the case; there are numerous instances when amplification is not available. Instead of a gain within that device, a loss actually takes place. The same is true of a-f systems; hence it is imperative that you appreciate the conditions which surround the application of the device so as to interpret its utility properly. Only when this is done is it possible to render proper judgment and to reach the proper conclusions after observation and tests.

Take, for example, r-f and i-f systems. These embrace a variety of transformers, such as those which have a single primary and a single secondary wherein the primary may be of a few turns and the secondary of many turns, with or without a resonating condenser across the secondary winding. Then, there are the transformers which have about equal turns in the primary and the secondary, with and without resonating condensers across the primary or secondary, or both. And finally there are the transformers which have a single primary and a single secondary but wherein the number of turns in the primary is greater than that in the secondary, but the secondary is resonated by a condenser.

That each type is used in a certain system is no accident. It is the result of a deliberate attempt to accomplish a certain end, with respect to the other equipment associated with the transformer. With respect to amplification within such transformers, (neglecting all other associated equipment, like the vacuum tube) only one type provides amplification within the transformer itself; the one wherein the number of turns in the primary is much less than that in the secondary, with or without the resonating condenser across the secondary. As a rule, such a tuning condenser is present and this kind of transformer is typified by the antenna transformer and by the r-f transformers employed in some of the other receivers utilizing triodes and tetrodes.

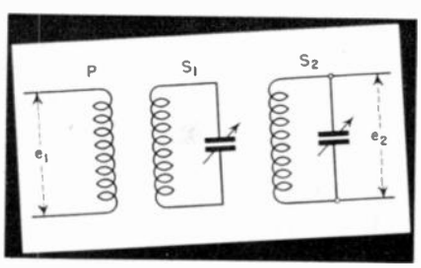


Fig. 1. Three-winding r-f or i-f transformer, consisting of primary P, secondary S2 and tertiary S1. Such transformers seldom provide gain.

NO-GAIN TRANSFORMERS

The r-f transformers employed with pentodes, and i-f transformers used with tetrodes and pentodes with or without primary tuning condensers, are of such design that there is no gain within the transformer. In other words, the voltage across the primary winding is the same as that present across the secondary. This assumes proper tuning of both the primary as well as the secondary condensers, if both are used, or proper tuning of the secondary condenser, if only that one is used. Furthermore, this also assumes that the secondary winding is feeding into a circuit wherein there is no current flow. When there is such a load upon the secondary winding, as for example in the case of the diode demodulator or detector, a loss occurs in voltage transfer within the transformer and this is normal. Such a step down in voltage may be as high as 3:1, although as a rule it approximates 1.5:1 to 2.5:1.

The reasons behind these conditions surrounding r-f and i-f transformers will be discussed in more detail after we have said a few more words about three-winding r-f and i-f transformers *(Fig. 1)*. As you probably know, all r-f and i-f transformers are not of the two-winding variety; that is, a single primary and a single secondary. Many receivers have made use of three-winding transformers, wherein there is a primary, a secondary and a tertiary winding. In the case of the r-f transformers, the secondary and tertiary windings are tuned, whereas in the case of such i-f transformers all three windings are tuned to the same frequency.

Because of the conditions found in the primary and secondary windings of the r-f transformers, confusion has been created during signal tracing when the third winding was checked. Generally, a definite amount of amplification is found between the primary and secondary windings, but between the secondary and tertiary windings, about the best that can be obtained is a close approach to unity transfer of the signal voltage. In most cases a slight loss is experienced. The fact that there

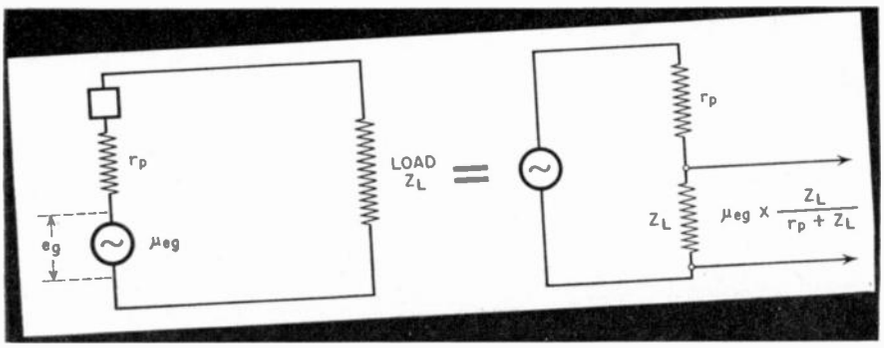


Fig. 2. Schematic representation of a triode amplifier.

is no increase in signal between the secondary and tertiary windings has misled many to believe that a defect exists. The conditions mentioned do not indicate a defect, unless of course the signal voltage across the tertiary winding is very much less than that across the secondary winding. A small reduction is to be expected, for the primary purpose of such three-winding r-f transformers is to provide added selectivity.

The same is true of three-winding i-f transformers, *(Fig. 1)* provided that the function of the three-winding transformer is to provide added selectivity and not the control of some other vacuum-tube circuit by means of the voltage across the tertiary winding. In the event that added selectivity is the goal, then unity transfer of voltage is to be expected between the primary and secondary, or perhaps a slight loss, and a still greater loss between the secondary and tertiary windings. If, however, the purpose of the third winding is to control some tube circuit, then it is impossible to state in general terms what is to be expected of the third winding, for it depends upon the individual design.

There are in use in many receivers i-f transformers, wherein the coupling between the primary and secondary can be varied, thereby controlling the selectivity. However, the control of selectivity also affects the transfer of voltage between the primary and secondary. Assuming that both primary and secondary windings are tuned, so that unity transfer of voltage takes place under optimum conditions; that is, with a single-peak response curve, the degree of coupling will control the signal voltage across the secondary. The looser the coupling between the two windings, the less the transfer of voltage from the primary to the secondary, hence the greater the signal voltage loss or step down within the transformer.

What we have said here is by no means a complete description of all of the different kinds of r-f and i-f transformers, but it does cover the most popular varieties, hence should be of some value. However, speaking about r-f and i-f transformers is not sufficient when we are desirous of deriving facts about amplification in such systems. It is also necessary to speak about the vacuum tube.

TRIODE SIGNAL TRANSFER

In the discussion of the manner in which a signal is transferred from a triode amplifier to the load, we shall assume that you have the knowledge concerning the general manner in which a vacuum tube works, and while in this discussion most of the attention is focused upon r-f amplifiers, practically all of what is said can be applied to a-f systems as well.

Being familiar with the manner in which a signal fed to the control grid of a triode is reproduced in amplified form in the plate circuit, you can readily comprehend a different presentation of the amplifying vacuum tube. Since the plate circuit contains an amplified version of the signal fed into the grid circuit and the signal voltage transfer out of the tube is associated with the plate circuit, we can forget about the grid circuit, once the signal has been fed into the tube, and consider the tube as a generator of a signal voltage. This voltage is assumed to exist in the plate circuit and in value is the same as that which would exist for a unit voltage input to the grid. A schematic representation of this is given in *Fig. 2*, wherein the plate of the tube is shown. Here rp is the internal plate resistance, and the a-c generator assumed to be in the plate circuit, is supplying a voltage equal to "mu", the amplification constant of the tube, times the unit input voltage to the grid, and Z_L the load impedance. The internal plate resistance of the tube is assumed to be the internal resistance of the generator.

If this typical case is that of a tube rated at 10,000 ohms internal plate resistance and a "mu" of 10, then $mu \times eg$ is 10 volts and rp is 10,000 ohms. The fact that Z_L is shown as a resistance instead of a transformer winding is of no particular consequence, for what we say is true for both types of load impedances. Our concern lies with what happens to the signal voltage within the tube and the signal voltage developed across the load under various conditions, which in turn will furnish information relative to the action of different values of load impedance.

Since the tube circuit shown to the left of the equal sign in *Fig. 2* is the equivalent of a generator, we can show it in simplified form as in the diagram to the right of the equal sign in *Fig. 2*. The generator, (the plate circuit) now is in series with the internal impedance rp and the load impedance Z_L. The total signal voltage is available across this series combination, hence any division of this voltage will be in accordance with the respective values of rp and Z_L. As far as we are concerned, we desire the maximum voltage across the load impedance Z_L, for then we are taking the maximum signal voltage out of the tube. Whatever signal voltage drop takes place across the internal resistance rp, is entirely useless to us, hence we desire it to be the minimum.

If $rp = Z_L$ the signal voltage will divide 50-50 and half the signal voltage present in the plate circuit will be lost to us. The greater we make the load impedance with respect to the internal resistance rp, the greater will be the voltage drop across the load outside of the tube, hence the greater the signal voltage taken out of the tube. But, you will say, the greater the value of Z_L, the less the current in the tube, which is correct, but not of much importance, for it does not change the total signal voltage present in the plate circuit. Whatever the value of the current in the plate circuit as determined by the $mu \times eg$ value and the series combination of rp and Z_L, the greater the ratio between Z_L and rp, the greater the amount of signal transferred from the tube to the load.

However, there is a limit to the value of Z_L, that is, a practical limit which is determined by the value of rp as well as by the value of the plate-voltage supply source. No matter how high we make Z_L, we can never attain 100 per cent transfer of voltage and the higher that we make Z_L, the higher must be the plate voltage supply in order that sufficient voltage be effective at the plate of the tube during its operation. Therefore, considering all of the factors involved, we find that a useful and practical limit for Z_L is about 10 times rp, when rp is not greater than about 40,000 or 50-000 ohms. This provides about 90 per cent of the available signal voltage across the load impedance, as determined by the equation

$$eZ_L = \frac{Z_L}{rp + Z_L} \times mu \times eg$$

In this theoretical example, the signal voltage across a load impedance of about 100,000 ohms would be 9 volts when a 1-volt signal is applied to the grid. Actually this is much more than is realized in practice. As a rule, if we may be permitted to digress for a moment, triode amplifiers with resis-

(Continued on page 14)

A Letter to the American Public

Dear Radio Listener:

According to the article "The Radio Repair Man Will Gyp You If You Don't Watch Out" in the August 1941 issue of *The Reader's Digest*, your chances of receiving fair treatment at the hands of the average radio servicemen are mighty slim. You will, as the author declares, be cheated 64 out of every 100 times. That's pretty awful.

Or it would be awful if the situation were as bad as it has been painted—which it isn't. For one thing, the investigator was out looking for dishonesty—for that was his assignment—and dishonesty is not difficult to find in any walk of life if one makes it a point to seek it out.

It goes without saying that there are gyps in the radio repair business—and the radio industry would like to see them stamped out—but in branding a man as a gyp it is important, if justice is to be served, to know on what presumptions he has been found guilty.

By their own admission, neither the author nor the investigator retained by *The Reader's Digest* have any knowledge of radio whatsoever. They had, therefore, to accept statements on faith, which is a poor way of arriving at facts.

This "blind spot" in the investigation is responsible for having formed one presumption that is definitely misleading and serves to incriminate not so much the dishonest radio serviceman as the honest one. All progressive radio repair men use modern test equipment by which they are able to "trouble-shoot," diagnose, repair and align modern, complex receivers in the shortest possible time, and therefore at the lowest cost to the customer. Equipment of this nature in the hands of competent servicemen brings to light many obscure faults in minutes, where obsolete test equipment (or the ancient "voltmeter way") takes hours—sometimes days.

Yet, because the proprietor of a Madison, Wisconsin, shop was so artless as to say: "That stuff makes a beautiful display, but all you need is a voltmeter and a few other little things," the authors of the article jumped to the conclusion that "radio testing panels," as they call them, are "Rube Goldberg" equipment. Though Mr. Patric, the investigator, has since told us that he was specifically refering to "many deliberately elaborate and impressive radio testing *panels*" and not the test equipment itself, the fact remains that the public read considerably more into the paragraphs. Moreover, Mr. Patric gives his definition of "Rube Goldberg" as a "mechanical overindulgence," which is intellectually brilliant, but to the average American a Rube Goldberg contraption is something that is humorously cockeyed and merits no confidence.

The proprietor of the Madison, Wisconsin, shop was subsequently interviewed, and though he admitted that he had not been misquoted by Mr. Patric, he was emphatic on the point that the quotation was improperly used. This we can understand, for "a voltmeter and a few other little things" *are all that are necessary in seeking out the simple "breakdowns" Mr. Patric contrived before approaching a radio repair man.* Moreover, this very same proprietor *owns and uses a complete array of modern test equipment.*

What, in the name of heaven, must Mr. Patric and Mr. Riis think of the equipment used by doctors, hospitals and clinics for the rapid and accurate diagnosing of human ailments? It is certainly impressive-looking. Is it also "Rube Goldberg"?

The *Digest* authors seem also to have worked on the assumption that radio repair men make their living—or *should* make their living—entirely from the manual labor involved and the legitimate profits derived from the sale of replacement parts. Hence, of the 304 radio repair men "tested," the investigator found only 109 "honest" men, because *76 of them made no charge for locating the trouble* and the remaining 33 made a charge *so trifling as to class them also as honest!*

Presumably it never occurred to Mr. Patric that the radio repair man's basic commodity is *knowledge*, just as knowledge is the basic commodity of a doctor—and neither could remain in business if they didn't charge for the use of it. To classify a serviceman as dishonest because he charges more than a trifling amount *for knowing what to do* is decidedly unjust. If anything, we are surprised that as many as 109 radio repair men treated Mr. Patric—a transient—as well as they did.

Final evidence of editorial irresponsibility on the part of *The Reader's Digest* is to be found in the fact that the article was not submitted to an impartial, authoritative source for the purpose of obtaining an opinion on its fairness before publication. Either the editors didn't care, or were so dead sure that the article presented an accurate picture of conditions in the radio repair business, that they went no further than to have "an independent radio laboratory" check the article for *improper technical terms.* No *opinion* was sought.

In conclusion, had the editors of *The Reader's Digest* wished to protect the public against the gyp in the radio repair business, they could have done better than to have suggested that the set owner acquire an elementary knowledge of radio. They could have pointed out, for instance, that the easiest and most sensible way for you to guard yourself against gyppery is to patronize a man in your community who is either a "Certified Service Dealer" or a member of a recognized association of radio servicemen, such as the RSA, the PRSMA, the RTG, and many others, that guarantee the work, the integrity and fairness of prices charged by their members.

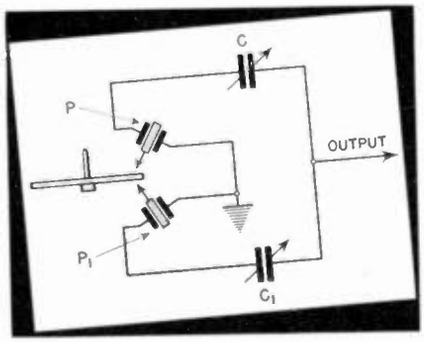
Very truly yours,
S. R. Cowan, *Publisher*

Printed in the Interests of Certified Radio Service-Dealers by RADIO SERVICE-DEALER MAGAZINE

CIRCUIT COURT

Equalized Pickup Output

THE RECENTLY INTRODUCED *RCA Victor* RP-151 Automatic Record Changer is so designed that both sides of each record can be played in progression,



Adjusting trimmers C and C1 equalizes dual-pickup output.

thus dispensing with the necessity of turning a record stack. This is accomplished by the use of two pickups on the same arm, one pickup playing the upper side of the record and the other the lower side.

Since in this play-through operation of the changer, the pickups are used alternately, some means had to be provided for insuring equal volume output from both pickups, so that one record side would not play louder than another. This, as shown in the accompanying diagram, is accomplished through the use of series trimmer condensers, *C* and *C1*.

In adjusting the trimmers to obtain equal output levels, it may be necessary to repeat the operation, as there is a slight interaction between the two.

◆

Economical Power

AS AN INSTANCE of what can be done in the name of economy is the new *RCA* Model V-175 console-type receiver and phonograph. It is of typical ac-dc design, with series heaters, but employs 6-volt tubes—such as the 6SK7—and a 25Z6GT rectifier in a voltage-doubling circuit. The output tube—a 25L6GT—usually operated at plate and screen potentials of about 105 and 75 volts respectively, is, in this circuit, operated at plate and screen potentials of 162 and 132 volts respectively, and a grid bias of 9 volts.

The output (into a 12-inch speaker) is 3 watts undistorted and 5 watts maximum, as against respective outputs of 0.9 and 1.4 watts in the usual job.

Overall receiver gain is also higher, due to higher plate and screen voltages.

◆

Dual Feedback

IN THE NEW NO. 600 ac-dc receivers, *Stromberg-Carlson* employ dual inverse feedback in the power stage. As shown in *Fig. 1*, constant-current degeneration is obtained by omitting the cathode bypass condenser. Constant-voltage degeneration is obtained by feeding a portion of the beam-power tube's a-f output voltage back to the grid via the 100-mmfd coupling condenser *C7*. The use of this form of capacitive feedback favors the lower frequencies, since the reactance of condenser *C7* is less at the higher frequencies; the result is a larger inverse voltage at the high-frequency end, and therefore a greater attenuation in the treble range.

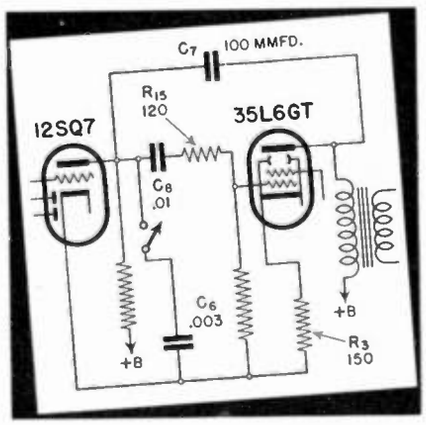


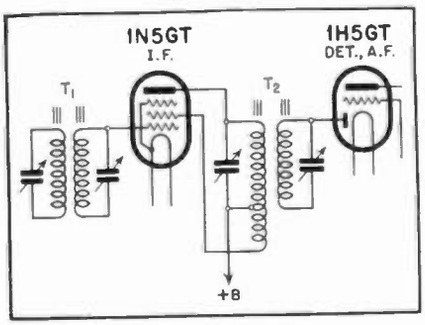
Fig. 1. Power stage with dual inverse feedback.

It should be noted that, for the sake of stability, a 120-ohm suppressor resistor, *R15*, is connected in series with the 35L6GT grid, to damp out transients.

◆

I-F Regeneration

INCREASED GAIN is obtained in some of the new *RCA* farm sets through the use of i-f regeneration. The arrangement used in the 25BT-2 is shown in the accompanying diagram.



Regeneration in screen circuit of i-f stage.

The primary of the i-f transformer is tapped, and the plate and screen voltage applied to this point. The primary functions somewhat the same as an auto transformer, with the result that the voltage developed across that portion of the winding below the tap, and in the screen circuit, is opposite in phase to the voltage across the upper part of the primary. Hence, the voltage on the screen is in-phase with the voltage on the grid, and regeneration occurs.

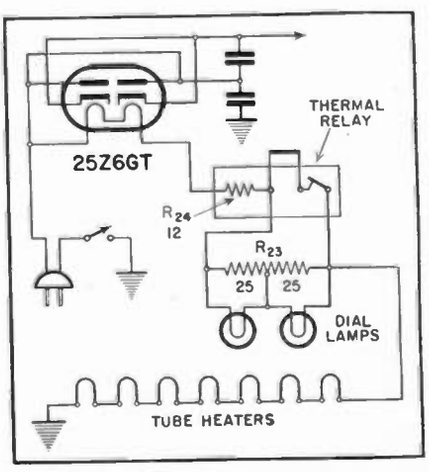
◆

Thermal Relay

IN THE NEW 1941-2 *RCA Victor* Models 28X and 28X5, and similar ac-dc sets, a thermal relay is incorporated to control the dial lamps.

Referring to the accompanying diagram, when the set is off the relay contacts are closed. This shorts out the

(Continued on page 24)



Thermal relay protects dial lamps and tube heaters.

Serviceman's Diary

J. P. Hollister

WEDNESDAY—Arrived a little late this morning and found Jerry already on the job, hustling around, setting up the p.a. outfit. He wasted no time on greetings.

"Come on, kid, pitch in!" he yelled. "We've got to jackass this p.a. outfit over to the army camp this afternoon. A dame who said she was the camp hostess blew in here last night and talked me into lending this outfit for a show they are throwing for the boys tonight. And now the mike won't work!"

"Okay, okay, take it easy," I told him. "I know what's wrong with the mike. But how come you get so generous all of a sudden? Are you lending the p.a. system purely from patriotic motives or is this hostess friend of yours such a beauteous damsel that the emotions which swell up in your bosom are—"

I dodged the roll of friction tape he threw at me.

"Listen, you!" he shouted. "If that's the way you feel about it, you can handle the whole job yourself. I don't want any part of it. You can go out there alone, kid around with the gang alone and, unless I miss my guess, after you see the hostess, you'll come back alone!"

It didn't sound too inviting—Jerry is seldom wrong about such things. But, at that, it seemed better than tackling a couple of intermittents which have been hanging around the shop bench for nearly a week, and can't be coaxed to cut out.

"Anything you don't want must be pretty bad," I answered. "But I'll take you up on it, provided you'll come out and give me a hand in packing up the p.a. outfit after the show. And, in the meantime, you can take over the three calls on the hook. After you finish them, there are a couple of nice intermittents on the bench which will do for dessert."

"It's all yours," Jerry grinned. And he picked up the calls and skipped out before I could get in another word.

Fixing up the mike wasn't much—just a break in the cable where it joined at the plug. The first 6J7 seemed microphonic, so I changed it for a 1620, which was much quieter. Checked over the 6L6's and other tubes. Everything OK. Had just about finished and was giving the mike the good old "one-two-three-four" with a whistle on the end, trying to listen to the speaker response while it was way out at the front of the store—to avoid acoustic feedback—and I was in the back of the shop, when I heard what seemed to be an echo—

"One-two-three-four yourself," it said. "And in the army if you whistle at ladies they'll make you march plenty."

I looked up and saw one of the swellest brunettes I've come across in a long time. Big, round brown eyes, glossy black hair framing an oval face. Her skin seemed a trifle olive, perhaps just from a healthy glowing tan. She held her chin high. Calm, poised, but nothing high-hat about her. I hadn't heard her come in, being so absorbed, but there she was, leaning against the shop door, watching me with a slightly amused smile. She was beautiful.

"Sorry," I told her. "I didn't see you come in. I'm just getting this ready for an army show. I'll have to remember what you said about whistling, but, you see—"

"I know—and thank you just the same," she interrupted. "But we'll have to get going if we are to have time for rehearsal. What I wanted to see you about was records. We'll need something light and bright to play—"

"Such as 'Lead, Kindly Light'," I suggested, remembering that the show was to be given in the YMCA hall.

"Not unless they've got that out in a swing version," she interjected. "Maybe you can dig up that new record about Aladdin's lamp."

I found it and put it on the turntable. It was a hot dance number. Pretty soon I noticed her foot tapping and suddenly she broke into a full-fledged tap dance. And, boy, was she good!

"Louder!" she called out. "That's the kind of music I need!" And she started to sing too.

I heard the door open and saw that Jerry had come back. He stopped for a moment at the door and stood watching the dance. Then he came over to me.

"Say," he said, with a funny-looking grin, "where did you dig up this baby?"

(Continued on page 13)

"Suddenly she broke into a full-fledged tap dance—and, boy, was she good!"

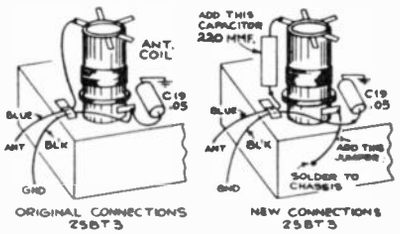
Shop Notes

RCA MODEL 25BT3

Hum Modulation

The following changes should be made in cases where hum modulation is experienced when operating Model 25BT3 from a CV-42 Electrifier power unit. It is *not* necessary to remove the chassis from the cabinet to make these changes.

1) Connect a 220 mmfd molded mica capacitor in series with the blue antenna lead, as shown.



2) Disconnect the black ground lead and *C19* from the bottom lug on the antenna coil. Connect a jumper from this lug to chassis. Connect the black ground lead to *C19* and tape the joint.

The original and revised connections are shown in the accompanying sketches.

◆

RCA OUTPUT TRANSFORMERS

Color Code

Changes have recently been made in the color code of RCA output transformers to conform to RMA standards. They are as follows:

	Old Color Code	New Color Code
Primary start...	red	brown
Primary mid-tap	black-red	red
Primary finish..	red	blue
Secondary start.	blue, or yl.	black
Secondary finish	black	green-red tr. or black

◆

RCA RECORD PLAYERS

Connecting Switch

To avoid hum in connecting a record-player switch to ac-dc sets in which the common negative wiring is insulated from the chassis, the shielding on the record-player switch should be connected, through a 0.25-mfd condenser, to the common negative wiring, not to the chassis.

◆

RCA V-170, V-200, V-201

Motor Rumble

Rumble is related to motor vibration, combined with a high-gain amplifier and prominent bass response.

The vibration of the motor in these instruments is as low as it can be made: Do not replace it to correct rumble. Rather, reduce the low-frequency response by shunting a 50,000-ohm, ¼-watt resistor across the crystal pickup terminals.

◆

RCA VICTOR U-MODELS

Installing Model No. 38567

Replacement for stock #31157/#31163 used in Models U-125, U-126, U-128, U-130, U-132, U-134, etc., consists of #38567 constant-speed motor, 105-125 v., 60 cycles; #38563 thrust bearing assembly; #38569 motor support plate.

To install, remove the original motor and support plate assembly from the instrument.

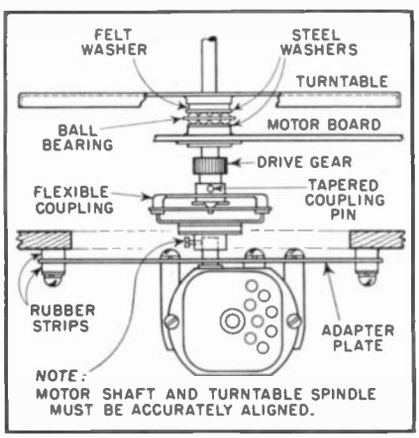
Drive out *tapered coupling pin* and lift turntable from mechanism.

Install #38568 thrust bearing assembly, consisting of two ground steel washers, one felt washer and ball bearing assembly, as illustrated. Apply slight amount of clean oil to this assembly.

Attach coupling to spindle with *tapered pin*.

Mount motor and support plate, being certain to *precisely* align turntable spindle and motor shaft. Improper alignment will produce a wow.

Mesh the flexible coupling, as illustrated —the same as the original arrangement. If rubber strips are worn or deteriorated, replace them with same stock type, #31147.



Connect the leads the same as for the original motor.

Motor #38567 is a shaded pole induction type, similar to that used on RP-139 Record Changers. Speed is non-adjustable. Speed tolerance for extreme load and voltage conditions is 77 to 81 rpm.

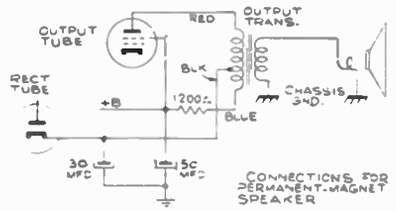
Remove *lower steel washer* from thrust bearing assembly if turntable tends to be too high, or if drive gear does not mesh properly.

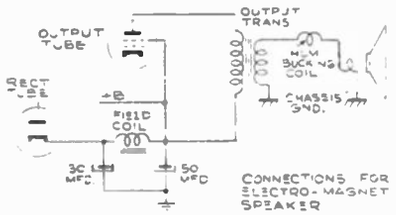
If mechanical hum is experienced, check flexible mounting of support plate; loosen if necessary. Cushion-mount motor if adjustment of the plate is ineffective.

RCA 1X, 12X, 14X SERIES

"PM" to "EM" Speakers

First production of these receiver models use RL-81-B2 permanent-magnet speakers.





In the second production, the type of speaker used is the RL-86-A3 electro-magnet type.

The circuit for each type of speaker is shown in the accompanying diagrams.

◆

SAPPHIRE PHONO STYLI

Surface Noise—Distortion

Phonographs equipped with some early type permanent or semi-permanent sapphire playback needles introduce a puzzling condition at times; the reproduction is excellent on some (and usually most) records, but is poor on others. Surface noise increases and the music is broken up or stringy.

Early sapphire needles of some types had a tip radius of .0025" which was considered optimum at the time since the standard phonograph record groove was supposed to have a radius at the bottom of .0023".

Recent increases in the volume of pressings, or other causes, have apparently resulted in sufficient variation from this standard groove shape that a percentage of records have grooves too wide for the .0025" sapphire tip radius, with the result that the needle skates in the groove bottom.

The more recent sapphire needles have a tip radius of .0027" which corrects the fault where it appears, yet without sacrificing quality of reproduction from records with grooves of normal shape.

It is very important that you do not confuse ordinary surface noise as a result of such a condition—many older pressings have high (comparatively) surface noise to begin with.

However, if the sapphire stylus has too small a tip radius, the amount of surface noise can be decreased by pushing the pick-up head with the finger either sideways or downward so as to increase *slightly* the needle pressure.

The RADIOFRONT

KARL A. KOPETZKY

By Way of Explanation

WE had just returned from Washington where we had been on a fact-finding foray, and what we had uncovered was not so good. Hesitantly, we put in a long-distance call to the publisher of this magazine and inquired whether he wanted us to "tell all."

Back over the wires hummed the answer, "Karl, write just what you found out, be it good or bad. But tell the truth, and we'll print it!" That sort of co-operation from a publisher is not to be taken lightly; and we were impressed with the sincerity of the statement, having known of men in the same business who were loath to have the truth published for fear of offending some advertiser or reader.

The reason why we make mention of this is that we feel that the radio picture, so-called, is undergoing drastic changes, and that the radio servicemen should really know what is going on, and be guided accordingly, let the blows fall where they may.

Anyway, here's the story we got in Washington . . . and right from the horse's mouth . . .

Washington Whoopla

Much has been said that "the honeymoon is over" about the radio manufacturer, but you can lay it on the line that Uncle Samson will shortly put the pressure right where it is going to hurt the most. Believe it or not, and this is particularly addressed to those west of the Alleghenies, we are engaged in a war. Of course, it has not yet degenerated into a shooting one, but it is an economic war. And that means that the shells are plants, the bullets are products, and the army is the vast numbers of men and women engaged in the factories throughout the country. In such a war, no quarter is asked nor is one given. And that applies to us as well as Hitler. Our Government is determined to beat Hitler with production at home, and the President has said so many times. Only there are still many who do not believe him.

These people take the whole thing more or less as an annoyance and are going about their business "as usual." To them a "priority" is just something that they may some day be asked for, and which they may have some day to give their suppliers. Not so the boys down at the OPM offices in Washington. They know what the score is and who is playing. They know that there are many manufacturers who are getting material in spite of regulations, and in spite of rules limiting outputs. They say, "These suppliers will soon stop that sort of thing entirely, because we are going to crack down!"

How are they going to do it? Well, during the last month, Uncle Samson mailed every plant in the country a form to be filled out. This document, when filed with the Government on September 16, will give fullest information as to stocks, inventories and machinery. From there on in the sledding will get tough. Take, for instance, the factory that has been shipping aluminum for civilian use without proper priority certificates. It must have gotten the aluminum from somewhere—the metal did not materialize out of thin air; and after September 16, it will have to have had all its stock registered with the Government. How then will it be able to explain the constant dribble of outgoing aluminum without proper certificates? The answer is that it will not be able to explain and that if it wants to stay this side of the bars, it will cease its extra-priority activity. This means that the other manufacturers who have been counting on that aluminum to get by without obtaining any priority certificates, will (1) have to get it, or (2) go out of business.

Since priority certificates for civilian work are as rare as the proverbial hen's teeth, the obvious result of the tightening will be a closer adherence to priority regulations and a great deal of cutting down in civilian manufacture. Both are results towards which the Government has been striving assiduously for months and months.

What does all this mean to the manufacturer of receivers? It means that either he will have to convince the Government that home receivers are part and parcel of a necessity warranting a priority rating of at least A-10, or else he will quit making home receivers.

There are some who state that the OPACS has assigned a priority to repair and replacement parts which will operate to keep the manufacturer in business. Not so. Only on September 4, OPMan Stettinius announced that home radio receivers were expressly *not* included in the repair and maintenance priority system. The R. & M. priority system is reserved for the repair and maintenance of some particular object needed to keep defense plants, or any one of nine different categories of industries going. Thus the R. & M priority system would permit one to purchase a valve for a broken radiator if one's plant were faced with a shutdown because of this occurrence. Particular emphasis is placed on the fact that the R. & M. priority system *cannot* be used for production. So how will the manufacturer be able to use it for the manufacture of replacement parts?

What, then, will happen to the radio set manufacturer? He will have to get himself National Defense work, or shut down! That's the hard and cold truth, no matter what you may read in the daily papers. The Government is determined that we shall have Armament Production if it has to ram it down the throats of the manufacturer by taking away everything else for him to do. Are the manufacturers getting any defense work? Some of them are, and others are not. There are those who cannot work to the closer tolerances required by National Defense contracts, and these will have to work with skeleton crews and on hand-to-mouth contracts of a civilian nature—crumbs from the table of National Defense.

What about the serviceman? His picture is not quite as dark. True it is that he will have much difficulty in getting his parts, but these difficulties will not be insurmountable. There are some manufacturers who have seen the writing on the wall, and have cut off their manufacturer-clientele in favor of the serviceman-jobber. These far-sighted individuals are not only building up a firm following in the jobber field, but are at the same time assuring themselves of a continuing business when this war—like all wars—ends. The Government has been much more lenient toward these few manufacturers because it agrees that theirs is the grave occupation to keep the radios *now* in the hands of the public in repair.

Conferences are going on almost daily seeking to find a good and substantial solution to the serviceman picture, and there is not any doubt in our minds that the serviceman will receive preferential treatment; even to the extent of including serviceman replacement parts, within the network of regularly assigned blanket priorities. In the serviceman, at least, one has a group whose very living depends on their being able to get the parts they need for repair and replacement of exist-

(Continued on page 13)

FLASH

Washington, D. C., NL, Sept. 11, Via RCA

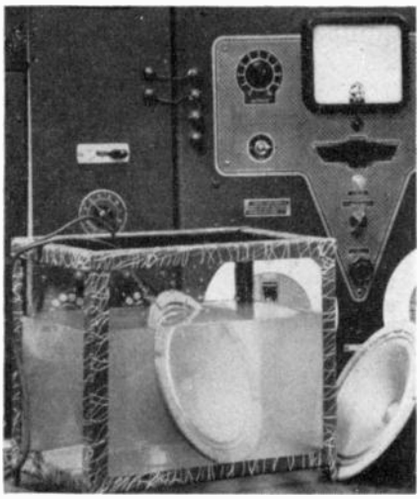
S. R. Cowan, Radio Service-Dealer:

Stop press to include following dope if possible: OPM reorganized to include Henderson as head of Civilian Allocation Office. All A priorities have been reserved for defense only and highest civilian priority is B-1 which must be obeyed after all other defense needs are met. Office of Civilian Supply more than anxious to keep plants open and they are sending out wires demanding that materials be released without priorities if material is available. Census being taken on OPM Form 69 will reveal much hoarded material and Government will follow up returns with personal investigation where suspicion is aroused. Big compliance section for this purpose has been organized.. Expect to bring all hoarders to trial and no fooling. But Henderson's office determined to curtail radio production as only solution to problem. Meanwhile OPM now busy getting radio companies to subcontract to keep little fellow in business, but it will take time. Main purpose of whole program is readily admitted to be the drying up of all sources of supply so that Government will be able to control raw materials in radio industry as well as all others. New policy in Government bids is to give a spread out in contracts and not to take the lowest one. Washington all agog about new setup. 73. *Kopetzky.*

NEW PRODUCTS OF THE MONTH

CINAUDAGRAPH

"The Mallard"—A new type of speaker, to be offered the general trade under the name of "The Mallard," has been developed for use by the U.S. Navy. Requirements called for under-water tests.



This problem was solved by the use of entirely waterproof materials throughout. The cone and spider were made of components which were water-resistant, and non-soluble cement was used in putting them together. All metal parts of the unit were first plated and then treated with a water-repellant coating.

Of interest is the fact that the speakers actually seemed to work as well under water as in air except for the greater power required to activate the unit. The cone action was the same in either medium, but the voice coil withstood 300% more wattage while completely immersed. This was due to the weight of the water pressing against the assembly, and the ability of the liquid to act as a coolant in dissipating any heat which might have resulted from the tremendous overload. It was found, for instance, that the wire safely carried the increased current under water, but burned through when the same power was applied and the speaker operated in air.

The Mallards are of the permanent magnet variety, and are specifically designed for marine and out-of-door installations. They range in size from 3½ to 12 inches. By Cinaudagraph Speakers, Inc., 921 W. Van Buren St., Chicago, Ill.

◆

SPRAGUE

Tapped Resistors—Type VD Koolohms answer problem of making up tapped resistors with any number of 10- or 15-watt sections of any required resistance values. They come equipped with ball and recess interlock feature. This prevents turning and automatically connects the units electrically in series when mounted on a threaded steel rod which is provided and which can be cut to any desired length. Mounting feet and ceramic end-spacers are also supplied. Several resistor sections can be connected in series and be mounted on the same tie rod and mounting feet with a similar assembly insulated from it electrically by means of the ceramic spacers.

Overall length of the 10-watt Type VD Koolohm is 1⅛" and diameter is ⅝". The 15-watt sections are 1-9/16" long by 11/16" in diameter. By The Sprague Specialties Co., Resistor Division, North Adams, Mass.

◆

OHMITE

Plate Choke—Type Z-O 2½-meter band r-f plate choke for transceivers, mobile rigs, diathermy equipment, etc. Single layer wound on steatite tube and moisture proofed. Mounted by means of wire leads. Size 1¾" long, ¼" diameter. By Ohmite Mfg. Co., 4835 Flournoy St., Chicago, Ill.

◆

GENERAL INDUSTRIES

Dual-Speed Recorder—Model G1-R90 recorder-phonograph assembly with dynamically-balanced, self-starting, heavy-duty rim-drive motor, weighted turntable with retractable record-driving pin, speed-change dial, record cutter and separate crystal pick-up. Streamlined plastic trim on the pickup and cutter arms in green and rich brown. Assembly mounted on walnut-grained steel base plate, ready for installation.

Cuts records up to 10" at either 78 or 33⅓ r.p.m., and plays recordings up to 12" at either speed. Cutter is equipped with depth-of-cut adjustment. Speed-change dial operates a compensating switch, permitting automatic correction for high frequencies at 33⅓ r.p.m. Turntable is recessed into a well in the base plate.

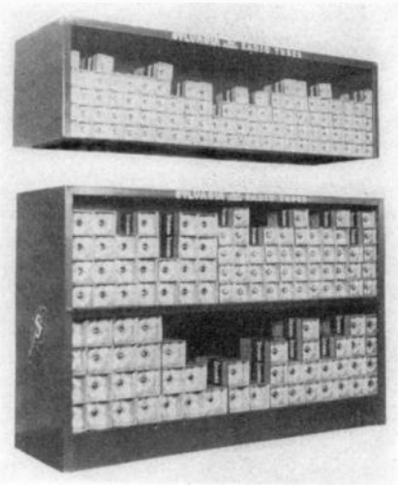
Model R-90-L is the same as Model R-90 but is equipped with a low-pressure pickup. By The General Industries Co., Motor Division, Elyria, Ohio.

◆

SYLVANIA

Stock-Boy Cabinet—A new olive green enameled cabinet base for radio tube stocks with provision for adding extra shelves. The base unit measures 34" wide by 22½" high by 12" deep, has two shelves and a bottom kick plate. The shelf "add-a-unit" measures 34" x 9¾" x 12".

Each shelf will hold from 70 to 140 tubes, one row deep depending on carton size, or as many as 420 tubes by employing the full capacity of the shelf. By Hygrade Sylvania Corp., Emporium, Pa.



◆

AEROVOX

Midget Micas—A new midget molded-in-bakelite receiving circuit mica capacitor, Type 1478, an elongated version of the types heretofore offered in the "postage-stamp" series. Body measurements are 1⅛" long by ⅜" wide by ⅛" thick. Hot-tinned brass wire leads provide the connections. The same molded casing is used for Type 1479 with silvered mica section.

Both types, because of the longer casing, provide for higher capacity values at the given 1000 v. test rating. The standard mica Type 1478 is available from .0001 to .002 mfd., while the silvered mica Type 1479 comes in .0001 to .001 mfd. By Aerovox Corporation, New Bedford, Mass.

◆

ALLIED

Recording Discs—Double-faced Knight recording discs, non-inflammable, slow-burning, and Underwriters' approved. Type C black coating on cardboard base. Currently available in 6½" diameter—8" and 10" size to follow.

Come packed in grey and maroon manila envelopes. By Allied Radio Corporation, 833 W. Jackson Blvd., Chicago, Ill.

(Continued on page 24)

SERVICEMAN'S DIARY

(Continued from page 9)

"Isn't she the army hostess?" I asked, a little puzzled. "She's in the show."

"Hell, no! Do you think I would be in such a hurry to turn over the job to you if I knew someone like this would be in the show? The hostess is a big, fat woman, old enough to be her mother. I think I'd better give you a hand, anyhow. Nobody was home at the first two calls and the other is an aerial job which I'll postpone till tomorrow. I just came back for the ladders."

"Nice of you, old man," I said soothingly. "But you needn't bother. I'll take care of everything myself. You just take your ladders with you and put up the pretty little wires while I suffer with this show company."

My "show company" was entering the grand finale. Picking up a 150-watt bulb from the counter, she started singing:

"I don't need Aladdin's lamp,
But I sure could use Aladdin!"

Jerry stalked out the door and slammed it.

I never saw him quite so disgusted.

◆

THE RADIOFRONT

(Continued from page 11)

ing receivers. Nor can these servicemen be put into National Defense (though many have hired themselves out to defense plants), so that Uncle Samson will be more than likely to see to it that the serviceman continues to get his parts—may even permit plants to operate solely for that purpose.

All in all, we have had priorities with us for some time; only many manufacturers have been taking them as a huge joke. The time has come for them to revalue their opinions of these certificates. It's going to be "With a priority, or no dice" and Uncle Sam is not fooling any more!

Odds & Ends

Because of the howl that went up from the Class A amateur radio ops, the FCC relented and kept the distinction awarded those who had that type of license. Class A license holders are still the *only ones* who may operate their stations on 'phone in the 80 and 20 meter bands . . .

Backing up our assertion of last month, plastics were wholly prohibited for radio cabinets by the OPM. Later, OPM gave in somewhat, and reduced the amount of plastic available for radio cabinets to 75%.

Want to go to London? If you have radio training and want to join the Navy as an Electronic Expert, write George W. Bailey, 2101 Constitution Ave., Washington, D. C., for the necessary blanks. Men are urgently needed for this work . . .

Funny thing! The youngest age at which one can be President is 35 years. But the youngest one must be to be a Lt. Commander in the Navy, to be commanded by a 35-year-old President, is 37 years. Doesn't make sense! . . .

That stuff you have been reading about spreading defense contracts to the small shop is still in the paper stage; won't be worked out 'till perhaps it may be too late to save the day . . .

Can anyone tell us why, if the Messerschmitt motor was such a model of perfection, the plane's radio was so antiquated? . . .

A word to the wise. The OPM forecasts a sharp reduction in radio sets manufactured in 1942 . . .

The word around the Capitol is that F.D.R. revamped the OPM set-up to frustrate that Senate investigation bill recently reported out of committee . . .

OPMan Stettinius seems to have answered the plea made by the RMA for a preference rating or priority allocation on scarce materials necessary to the production of radio parts for (1) Repair and Maintenance of Existing Receivers, (2) Sales "Off the Shelf" to Government Agencies, and (3) Standard Commercial Communication Equipment, with an A-10 O.K. except for home receiver manufacturer . . .

Although allottments of nickel to the radio industry were okayed by OPM, start-

ing with July quota, the industry has yet to get any of its June quota . . . which gives you an idea of what the manufacturer is up against . . .

The frequency of 3105 kc is now wholly reserved to itinerant private flyers, the scheduled airways having been shoved to 3117.5 kc . . .

First it was no aluminum, so the condenser boys went to steel for their variables. Now it's no steel . . . Guess we'll see the "Crosley-type" sandwich-condensers next . . .

Well, keep 'em rolling . . .

PERFORMANCE RATINGS

(Continued from page 6)

tive loads are so designed as to obtain about 75 to 80 percent of the available voltage.

How about tuned r-f amplifiers which use triodes? What happens in such cases? As far as the operation of the tube is concerned, it is identical to that already described, but because of what follows later in connection with tetrodes and pentodes, we have to dig deeper into the operation of the triode as an r-f amplifier. In the first place, the attainment of high impedances with coils is possible only in several ways. Either an iron-core coil is used, a coil of many turns is used, or a resonant condition is created. The simplest and most practical is, of course, the resonant condition, for in r-f amplifiers a need for selectivity also exists as well as high impedance in order to secure the maximum gain. But the accomplishment of resonant systems in triodes is not as easy as it may sound, for any attempt to utilize a resonant condition in the primary circuit, which is the plate circuit, would cause excessive regeneration, for the coupling between grid and plate within the tube is great. Such a system would, of course, provide a high load impedance, but it is beset with too many problems relative to stability.

A far more satisfactory method is the use of resonated secondary windings which means the use of a transformer which would couple the plate circuit of one tube to the grid circuit

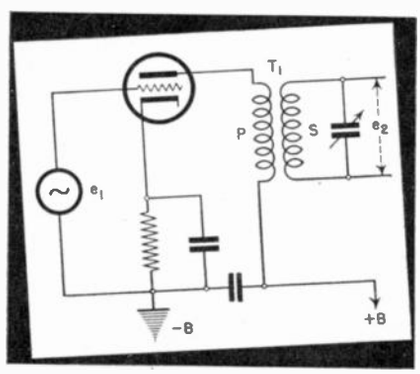


Fig. 3. In r-f amplifiers, employing triodes or pentodes, an r-f transformer with untuned primary and resonated secondary is normally used.

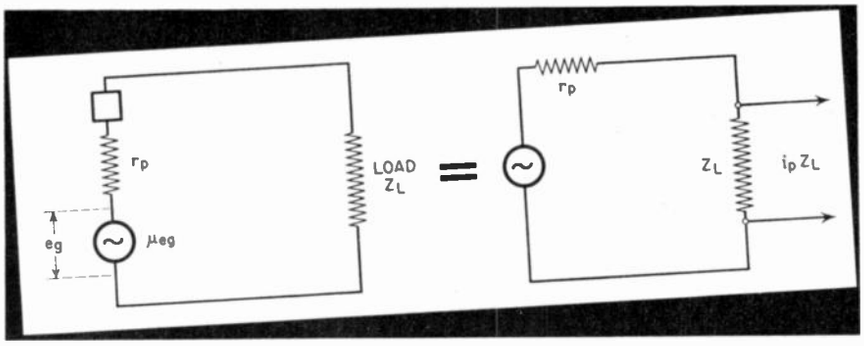


Fig. 4. Schematic representation of a pentode amplifier.

of the next, as shown in *Fig. 3*. Such was done by using a transformer which had a few turns in the primary and a resonated secondary. By itself, the primary impedance was very low at even the highest frequency, but when the secondary was tuned to resonance with the frequency of the signal voltage present in the plate circuit of the tube, both the primary and secondary acted as one, thereby creating in the plate circuit of the tube the equivalent of a high impedance, so that a reasonable amount of the signal present in the plate circuit appeared across the load.

Of course this fictitious impedance present in the plate circuit did not approximate 5 to 10 times the internal plate resistance *rp*, such as could be secured by means of a resistance, but it was unnecessary. While only a small portion of the actual signal voltage within the tube was transferred to the load, the fact that voltage step up was available within the transformer, compensated for the small amount of signal transferred from the tube to the load

Now, analysing the operation of the triode as a tuned r-f amplifier with a transformer of the variety described, we find a definite condition. As a result of the low impedance which the primary of the r-f transformer presents to the tube, the amount of amplification measurable between the grid of the tube and the plate is small, for most of the signal is lost across the internal plate resistance. But when the measurement is made between the plate and the grid of the next tube, which then includes the secondary (tuned) winding of the transformer, a gain is available (that within the transformer) so that a measurement between the grid of one tube and the grid of the next tube shows an overall gain; the amplification or step-up within the transformer compensates for the small gain between the grid and plate of the tube. This is an extremely important thing to remember, for while it is true that modern receivers do not use triodes as r-f amplifiers, there are many old receivers still in the field and measurements between grid and plate of an r-f tube may lead to misleading conclusions unless the facts given herein are recognized and the proper tests are made.

PENTODES

In contrast to the action taking place in triode type r-f amplifiers, a different condition prevails in the case of pentodes. Like the triode, the pentode can be considered as a generator, for the presence of the added tube elements does not change its status from that viewpoint. The pentode as a generator is shown in *Fig. 4*. While similar forms of presentation can be used for the triodes and pentodes, it is necessary to mention a major difference as far as plate current is concerned. In the triode the internal plate resistance is low, so that the introduction of the load impedance will have a material effect upon the plate current. But in the pentode, the internal plate resistance is very high, in fact so high, that it is

safe to assume that the introduction of the load impedance has no effect upon the plate current, so that the tube is essentially a constant-current generator.

The net result, therefore, is that when working with pentodes, we do not speak about the voltage drop across the load impedance with respect to the voltage drop across the internal resistance. It does not make much sense to do so, for even under the best conditions, most of the signal voltage is lost across the internal resistance. Fortunately, however, the amplification constant of the average pentode is so high that even when most of the signal voltage is lost or wasted across the internal plate resistance, there is a sufficient amount left across the load impedance, so that the amplification available with a pentode—that is, the useful implification—is many times that obtained from a triode.

Rather than speak about relative voltage drops, it is more convenient to utilize the fact that irrespective of the load, that is under all reasonable and practical conditions, the plate current will be constant regardless of the load for any unit value of signal input to the tube. This is the equivalent of saying that the mutual conductance rating of the tube identifies the plate current for a unit signal voltage input. Thus, if the tube is rated at 1500 micromohos, we know that we get a plate current of 1500 microamperes or 1.5 milliamperes per volt. It is because of this that in the right-hand diagram of *Fig. 4* we would identify the plate current i_p as being the input signal voltage times the mutual conductance interpreted in terms of the change in plate current per unit voltage input to the grid.

Since the plate current is known for the signal input, which we shall assume to be 1 volt, it is simple to determine the gain obtained by multipling the plate current by the load impedance. Thus, if the g_m rating is 1500 micromohos (1.5 milliamperes per volt input) and the load impedance is 40,000 ohms, the amplification obtained is 1500 x .04 equals 60.

Now, as to the difference between triodes and pentodes as r-f and i-f amplifiers, we find them numerous. The pentode differs from the triode in many respects, one of which is the greatly reduced internal coupling between grid and plate, which means that it is possible to use tuned primaries as well as tuned secondaries in order to obtain the highest possible load impedance in the plate circuits. This is done in i-f amplifiers. Here is where we find one major difference between the triode and the pentode amplifying stage.

Since both primary and secondary windings of the transformer are tuned to resonance, there is no voltage step up between them; in fact, in most cases there is a slight loss. The net result is that whatever gain is available in a pentode stage is that obtained within the tube, between the grid and the plate. Contrast this with the very small gain obtained between the grid and plate of the triode stage. Of course, assuming unity transfer of voltage between the primary and secondary of the doubly-tuned transformer, the voltage gain between the grid and plate of the pentode is also that which exists between the grid of one pentode and the grid of the other, for as we have said, the pentode transformer by itself contributes nothing. In fact, in most of the cases checked, an actual loss in voltage is found between the primary and secondary of such transformers, but this is not important, provided it is not excessive; for whatever small loss exists within the transformer is more than made up by the gain within the pentode, so that a gain check between the grid of one pentode and the grid of the other shows a substantial gain.

With respect to r-f transformers used with pentodes, it is natural that the primary will not be tuned, for this would greatly complicate the stability of the stage with respect to constancy of alignment. Yet, a high impedance is required in the plate circuit. The result is the use of a transformer which has many turns in the primary and a tuned secondary. The absence of any step up, or even the existence of a small loss between primary and secondary of the transformer at resonance, is more than offset by the high gain obtained within the pentode between the grid and plate. This, if you will recall, is a decidedly different state than exists in the case of triode type r-f amplifiers.

As to audio systems, or for that matter even r-f and i-f systems wherein resistance or impedance type coupling is used, the higher the load impedance, the higher the gain between grid and plate of the tube. As far as the coupling device is concerned (the resistance or impedance and capacity combination) in the majority of instances, no gain is available in the coupling unit, but this cannot be a blanket statement, for there are numerous instances when special resonant circuits are employed to accentuate certain frequencies, and for that matter, a loss may prevail if such resonant systems are used to attenuate certain frequencies. Of course neither the gain nor the loss will become apparent unless the gain measurements are made over a range of frequencies.

NEWS

RTA—Incorporating the *Radio Technician's Association* (Long Beach) under the State Laws of California as a non-profit association will shortly become final. Provision was also made that other groups may sublease under the RTA of Long Beach.

The Association's officers are to be retained for the remainder of the year. They are: *Harry E. Ward, Jr.*, President; *Walt Rundquist*, Vice President and Treasurer; and *Bob Hayden*, Secretary.

(Continued on page 18)

(Continued from page 16)

Elected—*S. N. Shure* of Shure Brothers and *Jerome J. Kahn* of Standard Transformer Corp. have been elected Chairman and Vice-Chairman respectively for the ensuing year by the Sales Managers Club, Western Group. They succeed *John J. Robinson* of Crowe Name Plate & Mfg. Co., and *W. S. Hartford* of Webster-Chicago.

◆

Offices Moved—Operations of the Electrovox Company are now consolidated under one roof with the moving of the New York offices to the newly acquired plant at 356 Glenwood Ave., East Orange, N. J.

◆

Rep. Moves—The *Blair-Steinberg Sales Co.*, manufacturers' representatives for Cornell-Dubilier, Bogen, University Labs, Jackson, Vaco and Atlas Resistor, announce the removal of their offices to larger quarters at 395 Broadway, New York City.

◆

New Company—Of particular interest to distributors and dealers in northern California and western Nevada is the announcement of the formation of a new company to be known as *Nickerson & Rudat*, with headquarters at San Francisco.

E. C. Nickerson

Mr. Nickerson was formerly with the Burgess Battery Company, serving four of his fourteen years there as Distributor Sales Manager.

Mr. Dan J. Rudat of San Bruno, California, northern California District Representative for Burgess for the past four years is a member of the new agency.

Offices have been established with the San Francisco Warehouse Co., 383 Brannan St., San Francisco. The agency will be manufacturers' representatives for the Burgess Battery Co. and other associated lines of merchandise.

APPOINTMENTS

Wilcox-Gay—*Charleston Electrical Supply Co.* have been appointed exclusive Wilcox-Gay distributors in the West Virginia territory.

◆

National Union—After a rich background of experience in both the technical and practical ends of radio, *E. J. Maginot*

steps into the position of Manager of the Sales Engineering Department at the National Union Radio Corporation. Mr. Maginot helped to organize the Radio Technician's Guild and served as President for three terms.

Coupled with this announcement comes word that *William J. Brennan* ties up with National Union as Sales Engineer from post-graduate work at Harvard University in Communications Engineering.

◆

RCA Elects—*Meade Brunet* and *Jay D. Cook* have been elected Vice Presidents of the RCA Manufacturing Company by the Board of Directors, it has been announced by *George K. Throckmorton*, President.

Mr. Brunet, whose services with RCA and predecessor companies dates from 1919, will continue his present duties as Manager of the Engineering Products Division, including U. S. Government business. Mr. Cook, whose 14 years with RCA and a predecessor company began in the cost accounting department, will continue in charge of the International Division, which handles the Company's export business and directs the activities of its foreign subsidiary companies.

◆

Radio City —Radio City Products Corp. announces the appointment of *L. M. Bornstein* to represent the company's line of test equipment in Missouri, Kansas, Iowa and Nebraska. Headquarters for this territory will be at 5418 Paseo, Kansas City, Mo.

◆

Webster-Chicago —*"Win" Hartford*, well known sales executive, has been appointed Sales Manager for Webster-Chicago. Mr. Hartford was previously connected with Kellogg Switchboard and Thordarson. He is Vice Chairman of the Western Division of the Sales Managers' Club.

◆

Howard —Howard Radio Co., Chicago, announces the appointment of *Raymond Jaffe* as Advertising Manager. Mr. Jaffe was previously connected with the advertising departments of leading radio mail order and manufacturing houses.

NEW LITERATURE

1942 Catalog—Allied Radio Corporation, 833 West Jackson Blvd., Chicago, Ill., is the first to announce the release of a

new 1942 radio catalog, it is said. A large publication comprising 212 pages, and with covers in color, it lists the 50

(Continued on page 22)

"TSK! TSK!" SAID ADAM HONEYMUG, "THE WAY THEY FUSS ABOUT CONDENSERS!"

Serviceman Adam Honeymug brushed a cobweb from beneath his chin, propped his feet more securely on the service bench and leaned back comfortably in his chair.

"These parts manufacturers are screwy," he said to his wife. "Take the time I was up in North Adams, Mass., and dropped into the Sprague factory. The way those fellows fuss around, you'd think condensers were the most important part of a radio set."

"Yes, dear," replied his wife patiently. "That reminds me. While you were over at the taproom, Mr. Jones called and said that condenser you put in his radio set had exploded. it scared the canary so it won't sing any more. He said if you didn't put in a good condenser this time, he'd come over here and kick your teeth in."

"What's he griping about, anyway? Just because I picked up that condenser for 16c and it doesn't have any name on, he thinks it's no good. He's screwy, too."

"Yes, dear."

"Well, as I was saying, kid, you'd a died laughing up in North Adams. Just think of it! They've got about twenty engineers, doing nothin' but designing condensers. I could do it with my eyes shut."

"I always said you were wonderful dear."

"I could certainly show those birds how to reduce the cost of condensers. Why, when they make wet electrolytics, do you think they'd take faucet water? It's good enough for 'em to drink—but it ain't good enough to put in their condensers. They built a special dam up in the mountains and piped spring water into the plant. They even distill that. They're screwy. I could . . . say, answer that 'phone, will ya."

"It was the telephone company," explained his wife a minute later. "They said they are cutting off our service until we pay our bill."

"To heck with them," exclaimed Adam. "I don't need a 'phone much anyway. Well, as I was sayin', those guys up at Sprague spent about 'steen thousand dollars developin' special machines to put the electrolytic formation on the aluminum foil used in dry electrolytics — just to make sure that every tiny bit of area was covered with the electrolyte. If they'd asked me, I'd a told 'em to paint it on with a brush."

"But maybe that wouldn't be so good, dear."

"Lissen, kid. I know what I'm talking about. Why, take the way they test condensers. They got about a billion good-lookin' girls doin' nothing but testing. They test the condensers for everything—capacity, working voltage, surge voltage, leakage and series resistance and goodness knows what else. Think what that costs."

"Yes, dear."

"Yea, but that ain't the worst of it. They even throw the bad ones away. I offered to buy some for half price, but they said they wouldn't let me have 'em at ten times the regular price. They'd rather bust 'em up for junk than get real money for them. If that ain't screwy. Hey—what the . . ."

"Oh, darling, the shop is on fire. Call the fire department, quick!"

"Huh, and give those screwy dopes down at the engine house a chance to wreck my business? Nothing doing. Let it burn. I don't much like this radio racket anyhow."

SPRAGUE PRODUCTS COMPANY
North Adams, Mass.

RSA NEWS

A VOLTMETER AND . . .

In the course of a series of letters between RSA's National Office and the *Reader's Digest*, RSA was given the name of the Madison, Wisconsin, serviceman who was quoted in the *Digest* as saying, "That stuff makes a beautiful display, but all you need is a voltmeter and a few other little things."

We thought you would be interested in a part of the interview between RSA's Executive Secretary and this serviceman, since it is especially revealing of the methods of *Reader's Digest* in their survey and article:

Stover: "Were you correctly and completely quoted in the *Reader's Digest* when they quoted you as saying, 'That stuff makes a beautiful display, but all you need is a voltmeter and a few other little things'?"

Madison Serviceman: "Well—to a certain extent. You know those 'few other little things' can cover a lot. I just said it more in a kidding way. Of course, as I told him, a fellow can service with just a voltmeter, but it would waste a lot of time and money for the customer."

Stover: "Then they didn't quote you accurately or completely?"

Madison Serviceman: "No."

Stover: "Do you yourself think the test *Reader's Digest* applied was a fair one to determine either the competency or the honesty of radio servicemen?"

Madison Serviceman: "No. Both the radio and auto troubles were things that do not happen. I've never experienced a tube coming out of the socket in a modern portable. It was funny about that car too—the Lincoln. It was definitely fixed for the test, a spade tip and nut being specially installed. It was not standard equipment and not one serviceman out of a hundred would have noticed it."

This serviceman's shop—far from having only a voltmeter and a few other little things—has among other equipment: Jackson tube tester with large display meter; Clough-Brengle service laboratory, including a cathode-ray oscilloscope, audio- and radio-frequency signal generators and a frequency modulator, all mounted in a rack for convenience, for display, and to protect the equipment; JFD ballast tube tester; numerous analyzers and meters in all parts of the shop; complete set of twelve Rider's service manuals, etc. When asked whether he used all this equipment in servicing, he said he did whenever its use saved time or made possible a better job—the answer of every competent and trained serviceman.

Our object in this correspondence with *Reader's Digest* has been to convince them that they have not helped RSA's purpose of directing the radio public to the honest, competent, and well-equipped servicemen. However, it seems improbable that they will right the wrong they have done honest servicing. It is up to each serviceman to publicize RSA's *Code of Ethics* to the public as his personal business principles. Tell them how *you* stand.

SECRETARY'S LETTER

Danville, Illinois
August 30, 1941

Dear Fellow Servicemen:

After nearly three months of operation since our reorganization, I can say that I am glad to have been a member of the Board of Directors of the RSA that executed that reorganization. Our plans were entirely governed by your needs and desires as they have been brought to our attention; the welfare of radio servicemen was always foremost in our minds. Our new Executive Secretary Don Stover, *is a successful radio serviceman himself, a man who understands your problems and the organization's needs. He has been an RSA worker and supporter since its origin. You servicemen have shown us by your support that our step was in the right direction. You have been aligning yourselves with this* new *RSA, showing the kind of enthusiasm that will win a better place for servicing.*

The service business is continually getting better and we servicemen do not have the time to look after our own interests in the industry as we would like to have them looked after. RSA, in addition to its many other advantages, is your *voice in this vast industry—and believe me, fellows, it is a good, clear voice that the whole radio industry will listen to with respect.*

During our national emergency many servicemen have gone into government service, and some have even discontinued their servicing profession to take their place in some phase of the defense program. We respect their loyal cooperation with our country. It is, however, for us remaining in active radio service to continue to strengthen the radio servicing profession so as to insure all those taking part in that profession the chance to live "The American Way" and to afford the luxuries that go with that way of living. RSA is fighting toward this end, and with the support of each and every radio serviceman, the battle will be won. So if you are not already one of our many members, let me encourage you to send your membership application with your dollar NOW and take your place in the American Radio Industry. Only in numbers is there strength. Join us now.

I started this letter telling you that I was glad to have taken part in RSA's reorganization, but I'm going to close telling you that I am proud *to be a member of the Radio Servicemen of America.*

Respectfully,

RADIO SERVICEMEN OF AMERICA
Cal Stapp (Signed)
National Secretary

Priorities on Replacement Parts

RSA joined the other branches of the industry in a request to the government for a preference rating to make radio parts available to you for the repair and maintenance of existing radio receivers. With the diverting of materials to the national defense, the problem of obtaining parts for repair is becoming increasingly acute.

The request points out the vital part which radio plays in national defense and public welfare, and asks a "preference rating or priority allocation of scarce materials which will enable the radio parts industry to continue the manufacture of parts necessary to supply governmental agencies, to keep existing radio receivers in repair, and to continue to supply standard commercial communication equipment. This allocation should be prior to the satisfaction of all other competing civilian demands."

As a national organization should, RSA is representing you in the industry and acting in your behalf.

Chassis-Marking System

Various systems have been worked out by Chapters to mark receiver chasses so that a glance will tell the approximate price of a former repair, or of an estimate for repair. All have been very helpful and have done much to stabilize prices in the servicing industry.

The simplest method that has come to our attention is one developed by the Oklahoma City Radio Service Association, RSA Chapter of that city. It can be readily applied, as no rubber stamps or other special marking devices are necessary—only a sharp edged tool for scribing a simple number and letter combination on the chassis is needed. Its use does not harm or mar the radio and is very inconspicuous; yet cannot be easily removed. At a glance a serviceman can tell who serviced the receiver (or estimated the cost of servicing), and the amount of such repair or estimate within plus or minus fifty cents.

The system is described by *R. B. Cherry*, President of the Oklahoma City Chapter: "Each radio serviceman has been designated by a number. We first scribe our number in an inconspicuous place on the back of the chassis. Following the number, a letter is scribed desig-

nating the amount of charges, starting with the letter A for $1.00, B for $2.00, C for $3.00, etc. The letter is followed by a plus or a minus sign to show the cost within fifty cents. For example, a member with number 4 assigned to him repairing or estimating a job for $3.80 would scribe on the chassis 4D—; member 11 doing a job for $2.40 would mark it 11B+; etc. The system is so simple it looks as though it might have some loopholes in it, but so far we have not found it wanting in any way."

Variations come to mind: If a closer marking is desired, A could be assigned to fifty cents, B to $1.00, C to $1.50, D to $2.00, etc. Also a character could be added preceding the member's number to indicate whether the marking means estimate or job done. Or a character could be added after the plus or minus to indicate whether the job was paid for cash or charged. And the date could be scribed on beneath the code. But let's not get too complicated. The beauty of the above system is its utter simplicity.

The value of such cooperative marking of chasses is readily apparent as a means of protection to servicemen and of stabilization of servicing prices. We believe every member could adopt it, both Chapters and members-at-large, with great advantage.

• • • —

CHAPTER CHATTER

Boston Chapter:

As a step to help counteract the article in *Reader's Digest* which wholeheartedly paints radio servicemen as gyps, Boston Chapter gave answer in a statement printed on the Sunday radio page of one of Boston's leading newspapers. The work of every member of the Boston Chapter is guaranteed by the Boston Chapter. Every radio broadcast station in Boston holds a letter from our Chapter containing this statement. Thus the members of the Chapter have a very convincing method of showing the quality of its members.

One of the features of the August 19th meeting, and a complete surprise to all, was an hour of sound movies through the courtesy of member *Walter Smith*. Eats as usual.

—Raymond C. Wyman, Chairman

Chicago Chapter:

Our second "Jobber House Party" was held on August 6th in the air-conditioned show rooms of Allied Radio Corporation. A fine lecture and demonstration of the latest types of f-m equipment was given by the well-known design engineer, *Mr. E. Kulikowski*, of Zenith. *Mr. W. C. Marsh*, Allied's sales manager, gave very interesting information on the newest ideas in electronic developments and details on how to make money with custom-built, high-fidelity equipment. Our famous superserviceman "Elmer Bloop" (*Gene Carrington* of Allied) entertained with new mysteries, card tricks, etc. In short, it was again a well spent evening for all.

We extend an invitation to other servicemen in the Chicago area to join us, because now is the time for a united effort directed to the radio listening public to make radio servicing the profession it should be.

—Helmuth Junkel, Publicity

Danville Chapter:

Our August 13th meeting was devoted to the recent *Reader's Digest* article. A heated discussion of the article, and a discussion of correspondence of the National Office of RSA with the *Digest* took plenty of time. The remainder of the evening was spent in discussing minimum prices, and it was decided that all RSA shops locally will have a minimum service charge of $1.00, and will charge at least fifty cents for testing tubes if the chassis of the radio must be removed from the cabinet.

—From the "Servicemen's Dirt"

Interstate Chapter:

A discussion of the *Reader's Digest* matter and of the activities of the National Office of RSA at our meeting of August 12th brought out the importance and need for a national organization. The manner in which *Don Stover* is conducting his office as National Executive Secretary is especially worthy of comment since the local chapters are receiving the prompt and efficient cooperation of the National Office. The members of the Chapter all pledged new activity in a campaign for new members.

The Chapter decided to pay the National Dues of drafted members so that they would be acquainted with the activity of RSA and the local Chapter.

At the close of the business session, a hamfest was conducted in *Mr. Oglevee's* shop. In view of the short time required to place a "dead one" in operation with the large amount of equipment owned by *Mr. Oglevee*, it was decided that a serviceman might be badly handicapped if he possessed only a voltmeter!

—Oscar W. Olson, Secretary

Jamestown Chapter:

The Jamestown Chapter has not had many activities during the past few summer months. Members have been very busy. A picnic was planned, but because of vacations of some and inability of others to attend because of work, the event was called off.

Considerable comment by members about the article in *Reader's Digest* prompted our Chapter president to write to the editor of that publication, for Jamestown is proud of its standards of business ethics and 100% RSA membership.

—Norman W. Smith, Secretary

Lehigh Valley Chapter:

August 4: Great deal of emphasis on the *Digest* item. Many members offered protest to the *Reader's Digest* in the form of personal letters. The Chapter Secretary's letter was read and given approval of the association as representative of their leanings.

August 18: Third Annual Clam Bake—top of Lehigh Mountain. A huge success.

L V

Over the Top with ——.

RSA

—Ray E. P. Abbott, Secretary

Minneapolis Chapter:

We've a darn good bunch of boys here in Minneapolis. Last August 5th we had a meeting of most of them and their wives. We had three reels of moving pictures and drank 48 bottles of pop. We discussed the article in *Reader's Digest* and an article in the Minneapolis *Star Journal* which informed readers that "Minnesotans generally don't have to worry very much about the gyppery of radio servicemen as outlined in the August *Reader's Digest*. A delegation from the membership of the Radio Servicemen of America's local Chapter called at this office Saturday to leave some very encouraging information about the situation in Minneapolis and the Northwest.... Every job is guaranteed. . . . Squawks can be turned in to the local Chapter.... So, to be sure that your radio repairing

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(Continued from page 19)

new Knight radio models and the 30 new Knight Sound Systems, as well as over 100 pages devoted to parts and test equipment for servicemen, and an Amateur Section. There is also a section covering fluorescent lighting equipment.

Copies of the new catalog are free on request to Allied at the above address.

◆

Red Book—The Earl Webber Co., 4358 W. Roosevelt Road, Chicago, Ill., have ready for distribution their new 1942 edition of the Red Book of Instrument Value, consisting of 8 pages. Featured is the Imperial Model 230 Signal Tracer.

◆

Counter Display—Recoton Corporation, 21-10 49th Ave., Long Island City, N. Y., have introduced to the trade a colorful counter display card. Acting as a silent salesman, it also is a novel dispenser for packages of Recoton Steel Cutting Needles, Stellite Cutting Needles and the Recoton special playback for home recordings. The merchandise is held pilferproof in the card and dispensed in a handy way and as handily refilled.

◆

Tube Supplement—Bringing the Fifth Edition, second printing, of the Sylvania Radio Tube Technical Manual up to date is a six-page, parallel fold supplement which lists all types announced in the interim. It is strip gummed on the back page permitting easy mounting to the inside back cover of the Technical Manual.

These supplements are being offered free to all holders of the Sylvania Technical Manual. They can be secured either through Sylvania jobbers or by writing direct to Hygrade Sylvania Corporation, Emporium, Pa.

◆

Amateur Folder—The Howard Radio Co., 1731 Belmont Ave., Chicago, announces the new edition of their amateur Folder 109, containing the complete line of Howard communication receivers. The booklet is available without charge from distributors or direct from Howard at above address.

◆

Window Trim—The Sylvania Radio Tube Division of the Hygrade Sylvania Corporation has released through jobbers a football theme window trim to Sylvania tube retailers throughout the country.

A cheering co-ed with the oval pigskin as a background on a 32" high easel display and a rugged fullback with his best foot forward on a 36" wide streamer dramatize the Sylvania Radio Tube story for the fall season. Printed in 8 colors.

RSA NEWS

(Continued from page 21)

isn't in the hands of the type of men about whom the *Reader's Digest* wrote, put the job in the hands of a member of this organization. That's simple enough, isn't it?

A picnic on August 17th was a roaring success, with free milk, ice cream, and popcorn, and beer and pop at cost. We had a number of contests with prizes donated by the jobbers of our fair city.

—Paul J. Ring, Secretary

Metropolitan New York Chapter:

Continuing our f-m course at our meetings of July 21st and August 18th, *Bill Gratson* reported on the Limiter and *Ed Weimer* introduced the subject of the Discriminator. Both men, in addition to other sources, used Rider's book on FM as their basic text. *Al Hall* also gave a superb and most enlightening lecture on balanced equations. Did you know that $7 \times 13 = 28$? Al can prove it!

A moonlight sail up the Hudson, jokes, pranks, laffs, entertainment and refreshments—just the chance to get away from it all! That was the bill of fare on August 25th.

"Brothers, we've gotta stand together. As never before we need to join in fellowship—in a brotherhood that will unify our individual efforts and make us collectively strong. It's not your fellow servicemen, but *you* who can help weld together one of the most effective organizations to be found anywhere. Honest, fellows, this is such a vital need, we just can't help pleading with you to come on along and get that new member or two to help make our RSA more representative of the vitally necessary radio servicing industry. . . ." (Excerpts from editorial by *Charles A. Wardlow*, Chapter President).

—From the "RSA Bulletin"

Oklahoma City Chapter:

We are down south where watermelon feasts are popular, so our August meeting had watermelons as the main attraction. Our summer meetings have been devoted to recreational activities.

—R. B. Cherry, President

Saginaw Chapter:

Our Chapter activity for the summer has been rather limited due to increased business on the part of the members and to vacations, but we have taken in three new members since June and hope to get six more by the time our first Fall meeting comes around in September.

We have had some excellent programs at our recent meetings, which are held at the Home Radio Service, 1927 N. Madison St., Saginaw, Michigan, usually on the second Wednesday of each month. *Neal Bear* of Radiart on vibrators and *Fred Stevens* of Hickok on test equipment were recent guests of the Chapter.

—Dale H. Hoag, Secretary

Tri-County Chapter:

We have been busy at the last couple of meetings making plans for our Chapter picnic which was held August 31 at Camp Paradise, near Johnstown, Pennsylvania. Members of the Pittsburgh Chapter RSA were also invited.

Our Chapter has purchased several books on the latest methods of servicing. We are going to have members study these and give a report at each meeting. We are also planning a visit to the Sylvania tube factory at Emporium.

Eddie Sobeiski of our Chapter has signed up with the British Civilian Corps. He will help service the various complicated radio equipment used in the defense of Britain.

—Blair Ressler, Secretary

CIRCUIT COURT

(Continued from page 8)

two lamps. When the set is turned on, the heater current flows through the 12-ohm relay element, *R24*. This resistor heats up and causes the thermal relay contacts to open, permitting the heater current to flow through the two dial lamps and light them. In normal operation, the lamps light about a half-minute after the set is turned on.

This arrangement prevents lamp burnout—and possible tube heater burnouts thereafter—by keeping the lamp filaments out of the heater circuit during that period prior to warm-up when the tube heaters draw excessive current.

◆

NEW PROOUCTS

(Continued from page 12)

RAINBO

Recording Disc—A new instantaneous blank that can be cold pressed. Base is of flexible fiberized board and surface coating of cold pressed nitro cellulose. Music and stock announcements can be pressed on the disc, with blank space for dubbing in of personal messages. Advertising messages and pictures on surface of blank do not interfere with recording or pressing. By Rainbo Record Co., Los Angeles, Calif.

Plotting the *Curves* of Progress

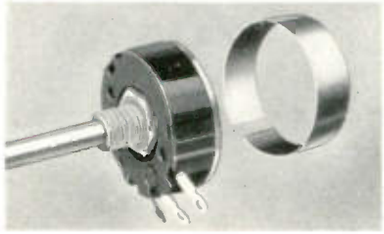
Old Man Centralab is not as old as his name would imply . . . he has a modern mind.

And, as new circuits come out of the laboratories, he is right there . . . abreast of the times with controls that say "uncle", and that fit into the tiniest places.

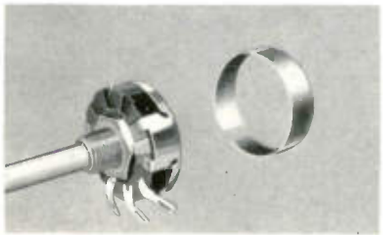
So when you run across a new job that needs a replacement control, you may be certain Old Man Centralab can fill the bill . . . and if it's an old "blooper" . . . there are any number of controls available that will make it "work like new". Old or new . . . there is invariably a CENTRALAB RADIOHM replacement that will do as well, or better than the original. "ALWAYS SPECIFY CENTRALAB".

Centralab RADIOHMS

CENTRALAB: Division of Globe-Union Inc.
MILWAUKEE • WISCONSIN



STANDARD: Wall type resistor hugs inner circumference of black moulded bakelite case. Exclusive non-rubbing contact band for quiet, smooth rotation and long life. 1 3/8" diameter x 9/16" deep. Available single, twin, or triple, plain or taped with one or two taps . . . with S.P.S.T., D.P.S.T., or S.P.D.T. Metal shaft extends 3 3/8" from case.



MIDGET: Companion to "Standard" . . . small size but large control efficiency. Available single, dual or triple . . . plain or one, two or three taps . . . with S.P.S.T., S.P.D.T., or D.P.S.T. Moulded bakelite case, 1 1/8" diameter, 1/4" metal shaft 3 3/8" long.

ELF: Small, but also features the long, straight resistor strip. Available plain or tapped with S.P.S.T. Switch . . . with or without dummy lug. Switch rated 2 Amps. 125 V. Underwriter's approved. Bakelite case 57/64" diameter, 17/32 deep (less switch) 25/32" deep with switch.

WATCH . . . for this full-page 2-color advertisement in Collier's Magazine for October 11. Display it in your windows and in your store. Reprints will be included free with the issue of RCA Radio Service News to be mailed to the trade in early September.

WHAT YOU SHOULD KNOW ABOUT RADIO SERVICE
During the National Emergency

In this National Emergency, our radios become increasingly important to us all. They keep us in touch with our Government's Defense Program and other events of the utmost significance. They stand as safeguards to national unity and as aids to national defense. Thus, the desirability of keeping old radios operating efficiently becomes evident—and especially so in view of present limitations on the production of new receivers, caused by shortages of certain essential materials.

Actually, the average radio receiver requires little attention. What it does require, however, should not be neglected.

WHEN DOES A RADIO NEED SERVICE?

It is seldom wise to wait for service until a radio stops operating entirely. As a rule, any receiver that has been in use for 18 months or more will benefit from a routine service check-up at a probable cost of not more than $1.50 or $2, depending on local rates. Most old receivers could be greatly improved, simply by the replacement of worn tubes. In other cases, the realignment of tuned circuits, the replacement of worn volume controls or other parts may make an amazing difference.

HAVE YOU A "RADIO EAR"?

Deterioration in essential radio parts may result in noise, distortion, tuning difficulties, weak volume, poor tone and other annoying factors. Often, this occurs so gradually you are not fully aware of it. Your ear comes to accept inferior reception as good reception, or you take poor operation for granted. With occasional attention from a competent technician, however, your radio should continue to perform satisfactorily for many years.

WHAT OF SERVICE CHARGES?

The reliable technician—and you'll have no trouble locating such a man—is equipped for fast, economical service on any radio. He will charge on the basis of time required, plus standard prices for any tubes or parts used. For minor jobs, he will probably charge his advertised minimum service fee. This is sound business practice—for your protection as well as for his.

It is also sound practice for the service shop to have modern test instruments. RCA service equipment, for instance, permits testing along the lines followed in the RCA Laboratories, and in RCA radio manufacturing. Such equipment is conducive to better, faster and hence more economical work.

It is sound practice for a radio serviceman to explain just what is required to repair your radio. No reliable technician will hesitate to do this. Moreover, he will search beyond the immediate point of trouble and, if necessary, recommend replacement of other parts which show signs of deterioration.

MODERNIZING OLD RADIOS

He may also suggest ways to modernize your radio, such as by adding a record player, by installing a noise-reducing antenna, or by some other means.

Throughout his business, he follows the same principles which guide any good professional man. He knows you will judge him, not by "quacks" which exist in his, as well as in other professions, but solely by his ability for reliable, economical service in making your radio perform better and last longer.

CHOOSING A RADIO SERVICEMAN

Like any other good business man, the reliable radio technician is best known by his reputation, by his skill, by his associations, by his equipment, by the manufacturers he represents, and by his standing in the community.

Although Radio itself may be a mystery to you, these common-sense business principles are not. Judge by them, and you will have no difficulty choosing the right man—whether he be the dealer from whom your radio was purchased, a well-established independent serviceman, a department store, or any other concern offering modern radio service facilities.

RCA MANUFACTURING COMPANY, INC., CAMDEN, N. J.
A Service of the Radio Corporation of America

RCA RADIO TUBES · TEST EQUIPMENT

RCA GOES TO BAT
FOR THE RADIO SERVICEMAN

Over three million buyers of Collier's Magazine will see the above advertisement. Millions of other readers will also see it. Reprints supplied for use by dealers and servicemen will reach countless more. Similar RCA advertisements devoted to radio servicing appearing later this Fall will carry on the good work.

These advertisements are published because RCA believes in the serviceman. We believe in his ability to do a competent, workmanlike job. We also believe that, in view of the national emergency with its curtailment of new radio production, his job of keeping old receivers working at top efficiency looms more important than ever before. Consequently, we regard it as both a duty and a privilege to bring these facts to public attention. A fairer appreciation by radio owners of the competent, honest job the modern serviceman is equipped to do should be a mighty good thing all around.

Where else can you obtain this support?

RCA

Tubes and Test Equipment

RCA MANUFACTURING CO., INC., CAMDEN, N. J. • A Service of the Radio Corporation of America

In Canada: RCA Victor Company Limited, Montreal